



**State of Louisiana
Department of Natural Resources
Coastal Restoration Division and
Coastal Engineering Division**

**2005 Operations, Maintenance,
and Monitoring Report**

for

**BARATARIA BASIN LANDBRIDGE
SHORELINE PROTECTION
PROJECT (PHASES 1, 2, 3, and 4)**

State Project Number BA-27, BA-27c, BA-27d
Phase 1, Priority Project List 7
Phase 2, Priority Project List 8
Phase 3, Priority Project List 9
Phase 4, Priority Project List 11

June 2005
Lafourche & Jefferson Parishes

Prepared by:

Brian Babin
Louisiana Department of Natural Resources (LDNR)/Coastal
Engineering Division
Thibodaux Field Office

Melissa Hymel
LDNR/Coastal Restoration Division
New Orleans Field Office

Suggested Citation:

Babin, B. and M. Hymel 2005. *2005 Operations, Maintenance, and Monitoring Report for Barataria Basin Landbridge Shoreline Protection Project(BA-27, BA-27c, BA-27d) (Phases 1, 2, 3, and 4), Louisiana Department of Natural Resources, Coastal Restoration Division and Coastal Engineering Division, Thibodaux, Louisiana. 17 pp, plus appendices.*



2005 Operations, Maintenance, and Monitoring Report
for
Barataria Basin Landbridge Shoreline Protection Project (BA-27, BA-27c, Ba-27d) – Phases 1,
2, 3, and 4

Table of Contents

I. Introduction.....	1
II. Maintenance Activity.....	7
a. Project Feature Inspection Purpose and Procedures.....	7
b. Inspection Results.....	7
c. Maintenance Recommendations.....	10
i. Immediate/Emergency Repairs.....	10
ii. Programmatic/Routine Repairs.....	10
III. Operation Activity.....	10
a. Operation Plan.....	10
b. Actual Operations.....	11
IV. Monitoring Activity.....	11
a. Monitoring Goals.....	11
b. Monitoring Elements.....	11
c. Preliminary Monitoring Results and Discussion.....	12
V. Conclusions.....	16
a. Project Effectiveness.....	16
b. Recommended Improvements.....	16
c. Lessons Learned.....	16
VI. References.....	17
VII. Appendices.....	18
a. Appendix A (Inspection Photographs)	
b. Appendix B (Three-Year Budget Projection)	
c. Appendix C (Field Inspection Reports)	



I. Introduction

The Barataria Basin Landbridge Shoreline Protection Project is located approximately 14 miles south of the town of Lafitte in Jefferson and Lafourche Parishes, along the shoreline/bankline of Bayous Perot and Rigolettes, Little Lake, and Harvey Cutoff Canal (Figure 1). This project consists of four separate phases and will provide a total of 107,500 ft (32,766 m) of shoreline protection to this area. Because of the large size of this project, construction will be broken down into smaller construction units (CU). Phases 1 and 2 of the Barataria Basin Landbridge Project include all of CU 1 and 2, a portion of CU 4, and all of CU 5. Phase 3 encompasses all of CU 3, a portion of CU 4, and all of CU 7. Phase 4 includes all of CU 6 (Figure 1). To date, CU 1, 2, and 3 have been completed. CU 4, 5, 6, and 7 are in various stages of implementation ranging from engineering and design to construction. The 2005 Operation, Maintenance, and Monitoring Report will cover the completed portion of the project only (CU 1, 2, and 3).

The Barataria Basin Landbridge Project is located within the Barataria Basin, which is bounded on the north and east by the Mississippi River, on the west by Bayou Lafourche, and on the south by the Gulf of Mexico. The upper portion of the Barataria Basin is a largely freshwater-dominated system of natural levee ridges, baldcypress–water tupelo swamps, and fresh marsh habitats. The lower portion of the basin is dominated by marine/tidal processes, with barrier islands, saline marsh, brackish marshes, tidal channels, and large bays and lakes. Historically, a small meandering Bayou Perot, and the longer, narrower Bayou Dupont-Bayou Barataria-Bayou Villars channels provided limited hydrologic connection between the upper and lower basin (U.S. Department of Agriculture/Natural Resources Conservation Service [USDA/NRCS] 2000). The hydrologic connections between the upper and lower basin are much greater today due to the Barataria Waterway, Bayou Segnette Waterway, Harvey Cutoff Canal, and substantial erosion and interior marsh loss along and between the now-enlarged Bayou Perot and Bayou Rigolettes (Louisiana Department of Natural Resources [LDNR] 2001). Major factors contributing to excessive marsh loss in this area include the elimination of overbank flooding of the Mississippi River; closure of Bayou Lafourche at the Mississippi River; dredging of the Gulf Intracoastal Waterway, Barataria Bay Waterway, Harvey Cutoff Canal, and oilfield access canals; physical erosion due to wind, boat-wake, and tidal energy; subsidence; and sea level rise (USDA/NRCS 2000).

Construction Unit 1 was completed in May 2001 and consists of various test sections along the west bank of Bayou Perot and the southeast bank of Bayou Rigolettes (Figure 2). The purpose of the test project was to evaluate the effectiveness of four different methods of shoreline protection at two separate locations in areas of extremely weak foundation soils. Approximately 1,600 linear ft (487.7 m) of shoreline protection was constructed at both locations. The structural components included a rock dike placed on freshly excavated spoil material, composite rock dike with light aggregate core encapsulated in geotextile fabric, rock dike using furrow method to place and encapsulate lightweight aggregate core, and pre-stressed concrete pile and panel wall (LDNR 2002a and b).



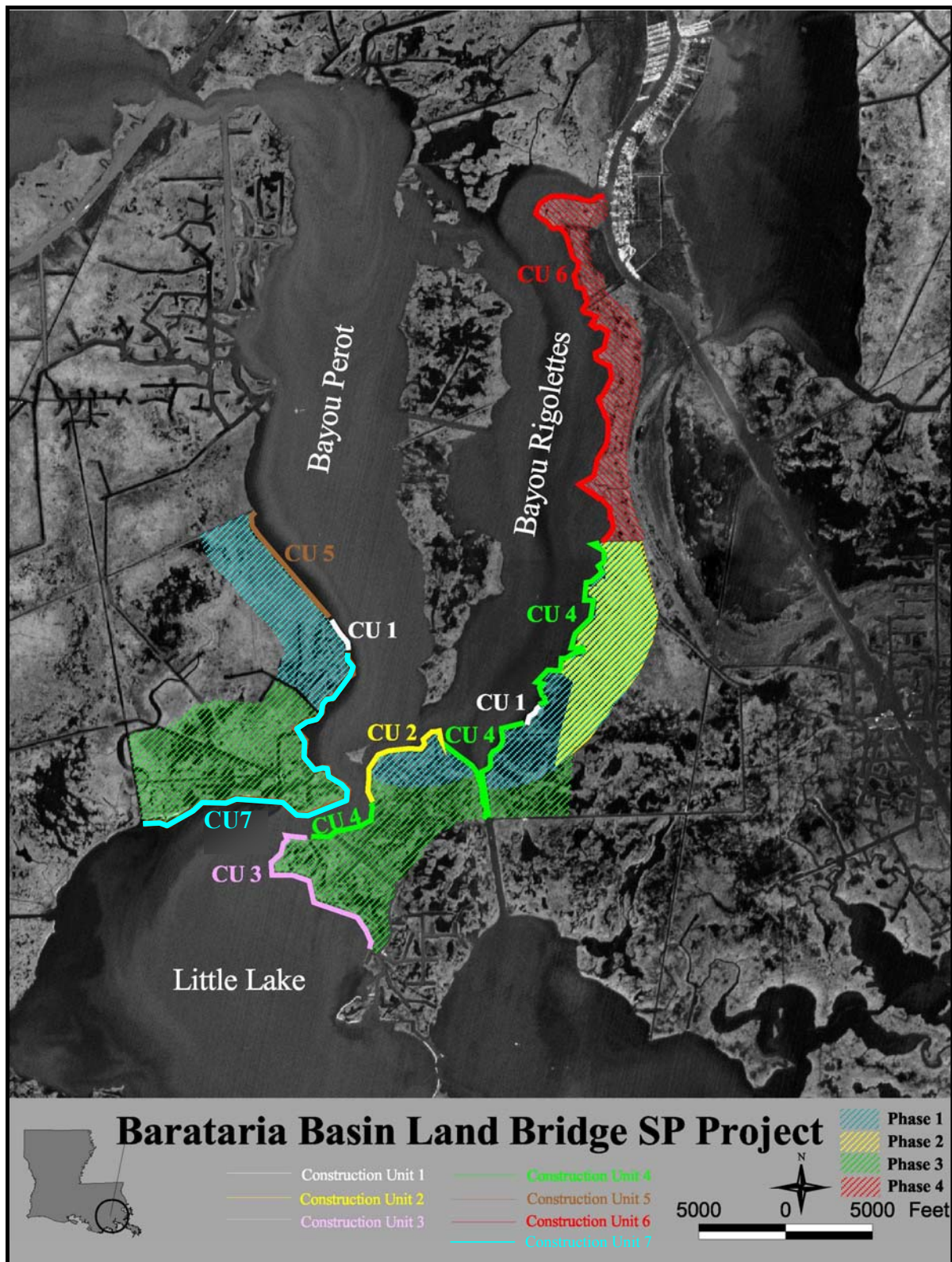


Figure 1. Overall map of the Barataria Basin Landbridge Shoreline Protection Project BA-27) showing all phases and construction units (map source: USDA/NRCS).

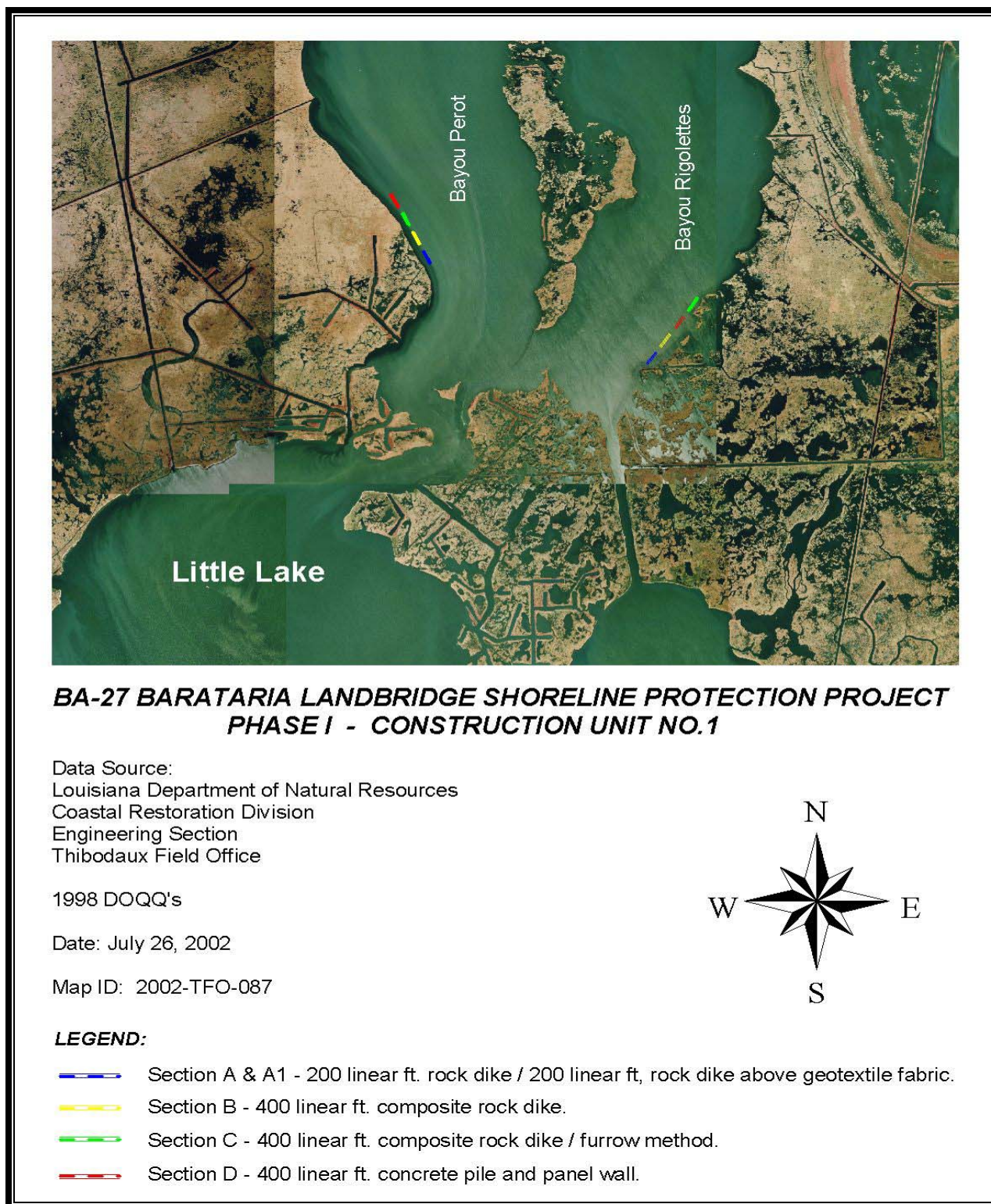


Figure 2. Project infrastructure map for the Barataria Basin Landbridge Shoreline Protection Project (BA-27) – Construction Unit 1. A and A-1 differ only in that one used spoil material as a base and the other did not.

Constructed features of CU 1 include the following:

- Section A and A1 consisted of 200 linear ft (61 m) of rock dike above geotextile fabric and 200 linear ft (61 m) of rock dike placed on freshly excavated spoil material. This construction technique tested the underlying organic substrate. The rock dike in both techniques was constructed to an elevation of +3.0 ft NAVD, with a 3-ft- (0.9-m-) wide crown and 4:1 side slopes.
- Section B consisted of 400 linear ft (122 m) of composite rock dike utilizing a core of lightweight aggregate encapsulated in geotextile fabric. This technique required the contractor to contain the lightweight material prior to placement in the water and install a 2-ft (0.6-m) layer of rock over the lightweight core. The rock dike was constructed to an elevation of +3.0 ft NAVD, with the 3-ft- (0.9-m-) wide crown and 4:1 side slopes.
- Section C consisted of 400 linear ft (122 m) of composite rock dike using a furrow method to place and encapsulate the lightweight aggregate core. This method uses small parallel sections of rock and two layers of geotextile fabric. The lightweight material is placed on the geotextile between the rock sections. The geotextile is then folded over the lightweight material and the aggregate core is capped with 2 ft (0.6 m) of rock. The two parallel sections of rock were constructed to an elevation of +1.0 ft (0.3 m) NAVD, with 1.5-ft (0.5-m) crown, and 2:1 side slopes. The rock cap above the aggregated core was constructed to an elevation of +3.0 ft NAVD, with a 3-ft- (0.9-m-) wide crown and 4:1 side slopes.
- Section D consisted of 400 linear ft (122 m) of pre-stressed concrete pile and panel wall. The piles were 16" x 16" x 80 ft (0.4 m x 0.4 m x 24.4 m) long and the panels were 20 ft x 6 ft x 6" (6.1 m x 1.8 m x 0.15 m) thick. The design incorporated 80-ft (24.4 m) piles, spaced 20 ft (6.1 m) apart. The wall sections were 6 ft (1.8 m) high, extending 1 ft (0.3 m) below the mud line at -3.0 ft (0.6 m) NAVD to an elevation of +3.0 ft NAVD. The toe of the panel wall is protected by a rock scour pad at the base of the wall.

Construction Unit 2, which is part of Phases 1 and 2, was completed in October 2002 and consists of approximately 6,403 linear ft (1951.6 m) of shoreline protection located at the southern end of Bayou Rigolettes and Bayou Perot west of the Harvey Cutoff Canal (Figure 3). Construction of this unit was completed in two reaches. Reach 1 (east side) consisted of the construction of approximately 3,691 linear ft (1125 m) of rock dike east of an existing location canal and the mouth of the Harvey Cutoff Canal. The rock dike constructed under Reach 2 (west side) began on the west bank of the existing location canal and proceeded west approximately 2,712 linear ft (826.6 m) along the southern shoreline of Bayou Rigolettes and Bayou Perot toward Little Lake. The rock dike for both reaches was constructed to an elevation of +3.5 ft (1.1 m) NAVD with a 2.0-ft- (0.6-m-) wide crest and 2:1 side slopes (LDNR 2002a and b).



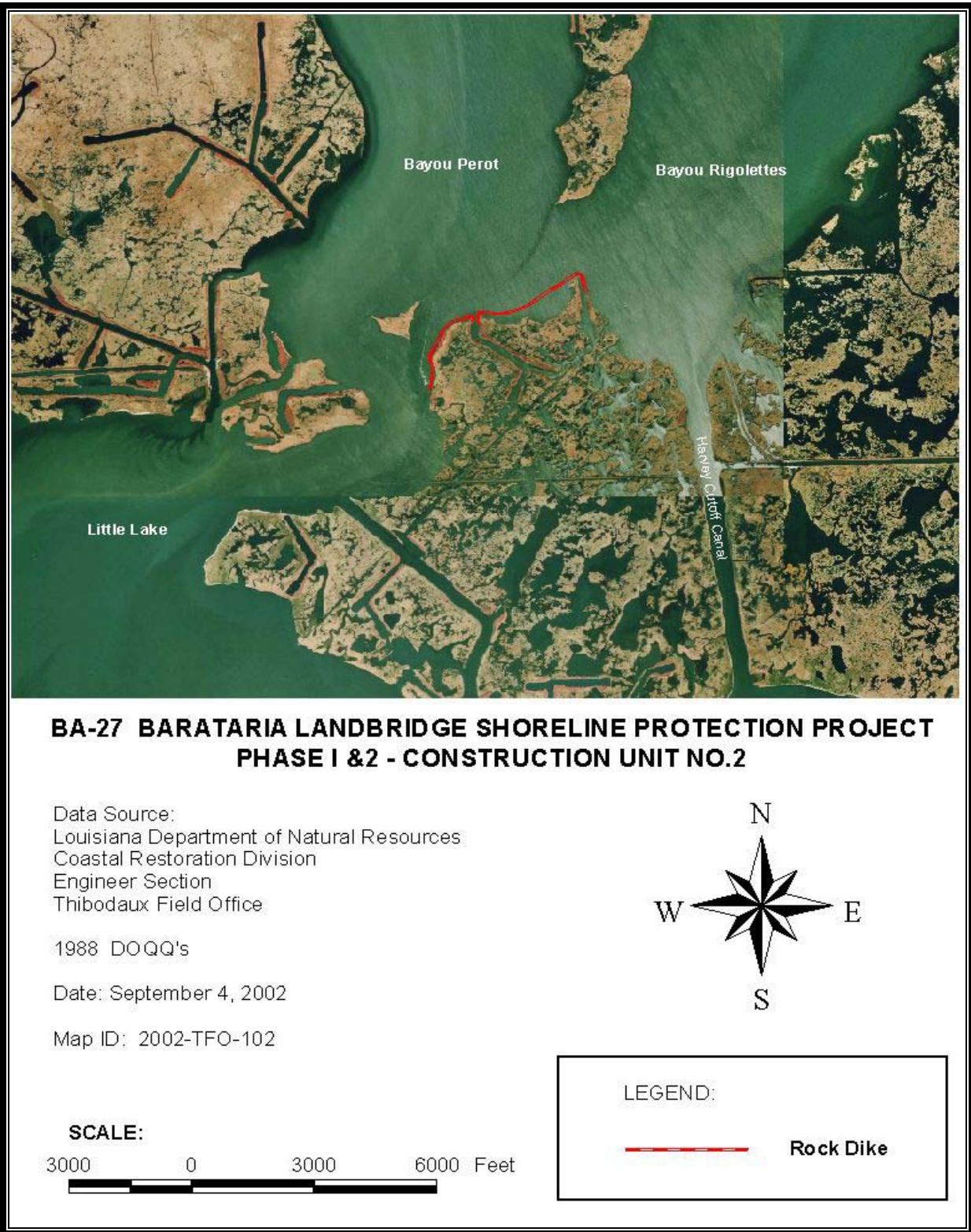


Figure 3. Project infrastructure map for the Barataria Basin Landbridge Shoreline Protection Project (BA-27) – Construction Unit 2.



Figure 4. Project infrastructure map for the Barataria Basin Landbridge Shoreline Protection Project (BA-27) – Construction Unit 3.

Construction Unit 3, which is part of Phase 3, was completed in May 2004 and consists of approximately 10,835 linear ft (3302.5 m) of rock dike along the northeast shoreline of Little Lake and the south bank of Bayous Rigolettes and Perot (Figure 4). The rock dike structure was constructed to an elevation of +3.5 ft (1.1 m) NAVD with a 4-ft- (1.2-m-) wide crest and 3:1 side slopes. Two 60-ft- (18.2-m-) wide fish dips were constructed to allow for marine organism access. The spoil material resulting from access dredging was deposited into seven small open water ponds located landward of the rock dike. The total area of marsh created from beneficial use of dredge material was approximately 30 acres (12.1 ha) (LDNR 2002a and b).

II. Maintenance Activity

a. Project Feature Inspection Purpose and Procedures

The purpose of the annual inspection of the Barataria Basin Landbridge Shoreline Protection Project (BA-27) is to evaluate the constructed project features, identify any deficiencies and prepare a report detailing the condition of such features, and to recommend corrective actions needed, if any. Should it be determined that corrective actions are needed, LDNR shall provide, in report form, a detailed cost estimate for engineering, design, supervision, inspection, construction contingencies, and an assessment of the urgency of such repairs (LDNR 2002a and b).

An inspection of the Barataria Basin Landbridge Shoreline Protection Project (BA-27) was held on February 18, 2005, under clear skies and mild temperatures. In attendance were Brian Babin, Elaine Lear, and Garrett Broussard of LDNR and Dale Garber and Mike Trosclair of NRCS. The attendees met at the Clovelly Canal Public Boat Launch at approximately 7:30 a.m. The inspection began at approximately 8:00 a.m. and ended at 11:45 p.m. The Gulf Intracoastal Waterway (GIWW) to Clovelly Hydrologic Restoration Project (BA-02) was also inspected on this day. The field inspection included a visual inspection of the project features constructed.

b. Inspection Results

Construction Unit 1

Due to time constraints, the test sections located along the west bank of Bayou Perot were not inspected during the 2005 Annual Inspection. However, the cumulative settlement data collected by NRCS to document the settlement rates of each shoreline treatment from January 2001 through February 2003 has been summarized below:

Bayou Perot Test Sections

Section A and A1 – From a visual inspection, it appeared that the rock dike has experienced uncontrollable settlement. This structure has settled as much as 12.3 ft (3.7 m) in certain locations.

Section B – The rock dike with light aggregate core has settled an average of 3.5 ft (1.1 m).



Section C – The composite rock dike by furrow method has settled approximately 3.5 ft (1.1 m) since the structure was completed in July 2001.

From the data above, the settlement rates of Section A and A1 are very high as expected from initial settlement rates measured during construction of the test sections.

Bayou Rigolettes Test Sections

After inspecting the test sections located along the east bank of Bayou Rigolettes, we found that the project features were in a similar condition as the previous 2004 inspection (see Appendix A – Photographs). No maintenance is required since the demonstration period has ended and the existing structures fall in the footprint of CU 4 which is scheduled to be constructed in late 2005. Below is a summary of the cumulative settlement rates collected by NRCS from the completion of CU 1 thru February 2003:

Section A and A1 – From a visual inspection and review of settlement plate data, it appeared that the rock dike has settled considerably since the completion of construction.

Sta. 17+24 – Cumulative Settlement: 6.30 ft

Sta. 15+24 – Cumulative Settlement: 4.30 ft

Section B – From a visual inspection and review of settlement plate data, it appears that the settlement of the rock dike with light aggregate core was less severe than the rock dike alone.

Sta. 12+49 – Cumulative Settlement: 2.40 ft

Sta. 10+43 – Cumulative Settlement: 2.00 ft

Section C – The composite rock dike by furrow method has settled approximately 3.5 ft (1.1 m) since the structure was completed in July 2001.

Normally, the project features constructed under a Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) demonstration project are removed once the demonstration period has elapsed. However, in the case of the project features constructed under CU 1 of the Barataria Basin Landbridge project, the existing structures will be enclosed by the construction of CU 4 (project features located along the east bank of Bayou Rigolettes) and CU 5 (project features located along the west bank of Bayou Perot).

In July 2002, the U.S. Department of Agriculture, Natural Resources Conservation Service prepared a Relative Cost and Short-term Stability Evaluation Report for CU 1 of the Barataria Basin Landbridge Shoreline Protection Project (BA-27) (USDA/NRCS 2002). In this report, the NRCS evaluated the relative construction cost, short-term stability and maintenance costs associated with the test sections of CU 1. Due to the unstable and poor substrate conditions predicted from geotechnical investigations of the project area, CU 1 was implemented to test various conventional and non-conventional methods of shoreline protection to determine the



most feasible and cost effective technique which would be both stable and long lasting (USDA/NRCS 2002).

The relative construction cost component of the report revealed that actual cost per linear ft of type B & C (foreshore rock dike with lightweight aggregate core and foreshore rock dike with light weight aggregate core by furrow method) were cheaper to construct than type A & D (foreshore rock dike, rock dike with earth core, and concrete sheetpile wall). However, it is stated in NRCS's evaluation that the actual cost of constructing types A, A-1, B, and C will be highly variable and highly dependent on the ability of the soil foundations to support the structure load and the height of fill. As the fill height increases, the volumes and resulting costs of rock and lightweight aggregate will increase at a rate greater than that of the pre-stressed concrete pile and panel wall (Type D).

Measurements regarding the short-term stability component were taken on a regular interval since the completion of each test section (USDA/NRCS 2002). Two cross sections and settlement plate data were collected prior to construction, immediately upon completion of construction of each test section, and at post-construction intervals of 30, 60, 90, 180, 270, 340, and 360 days. In addition to settlement, foundation-bearing capacity, slope stability, fill height, historical geophysical features (i.e., old channels and canals), and rate of construction are additional considerations which will affect the constructability and subsequent stability of any rock type structure and should be evaluated (USDA/NRCS 2002). Detailed analysis of actual versus estimated settlement graphs and post-construction settlement data of the test sections are shown in the Relative Cost and Short-Term Stability Evaluation Report prepared by the USDA/NRCS.

Long-term maintenance cost was also considered in NRCS's evaluation of the test sections for the Barataria Basin Landbridge Project. Rock and composite rock structures will likely require several maintenance events during the project life in which the placement of additional rock will be necessary to maintain the design crest elevation. Whereas maintenance of the concrete sheetpile wall may entail repair of damaged concrete, grouting of the pile to panel joints, and repair of exposed steel or replacement of piles and panels. Based on the projected maintenance of a 5,000 linear ft (1524 m) structure over a 20-year project life, the fully funded costs of a rock type foreshore dike is estimated at \$2,253,311 versus \$544,464 for maintenance of a concrete sheetpile wall (USDA/NRCS 2002). Actual costs and extrapolated cost data for 5,000 linear ft (1524 m) sections of each structure type along with costs per linear foot are broken down in the Relative Cost and Short-Term Stability Evaluation Report prepared by USDA/NRCS.

After evaluating the four different test sections of CU 1, NRCS has concluded in their report that the construction costs, structural stability, and maintenance costs support the selection of the concrete sheetpile wall as the most suitable method of shoreline protection in areas of highly organic soil foundations similar to the substrates found in the Barataria Basin Landbridge project area (USDA/NRCS 2002).



Construction Unit 2

As noted in the 2004 annual inspection report, we observed settlement along the rock dike at Station 31+00 at the mouth of the Harvey Cutoff Canal and near an existing pipeline right-of-way at Station 12+33. The crest elevation at these locations appeared to be between the elevations of +1.0 to +1.5 ft NAVD. Due to poor soil conditions at these two locations, the contractor constructing the project was unable to raise the rock dike to plan elevation after several attempts. The conditions of the rock dike at these locations mentioned above appear to have stabilized and no immediate maintenance is required at this time (see Appendix A – Photographs).

Construction Unit 3

After inspection of the project features of CU 3, we found the rock dike was in excellent condition with no deficiencies or defects noted. No maintenance or corrective actions are required at this time.

c. Maintenance Recommendations

Because CU 1 was implemented to evaluate several alternatives to shoreline protection in these areas and subsequent constructed units will enclose those reaches that have significant deficiencies, maintenance funds are not needed for the CU deficiencies. However, the concrete pile and panel wall reaches constructed under CU 1 will be repaired or replaced under future construction units if needed.

Overall, the project features of the Barataria Basin Landbridge Shoreline Protection Project (BA-27) – CU 2 and 3 were in good condition with only minor deficiencies noted in CU 2. No deficiencies were found which we believe would adversely affect the integrity and performance of the project. Therefore, no immediate maintenance/corrective actions are required at this time. A 3-year O&M budget projection and field inspection reports are included in Appendix B and C, respectively.

i. Immediate/ Emergency Repairs

No immediate or emergency repairs were identified as a result of the 2005 inspection.

ii. Programmatic/ Routine Repairs

No programmatic or routine repairs are needed at this time.

III. Operation Activity

a. Operation Plan

There are no water control structures associated with this project, therefore no structure operation plan is required.

b. Actual Operations

There are no water control structures associated with this project, therefore no required structure operation is required.

IV. Monitoring Activity

CWPPRA projects authorized for construction after April 16, 2003, will be monitored only with CRMS stations, other existing data collection, and any additional data collection specifically added to the project and funded separately from the normal monitoring budget. Therefore, Phase 4 of the Barataria Basin Landbridge Shoreline Protection project will not be monitored using the monitoring strategies outlined below. These strategies were developed for Phases 1, 2, and 3 of the project before the implementation of CRMS.

a. Monitoring Goals

The collective objective of these projects is to provide 107,500 ft (32,766 m) of shoreline protection to the area referred to as the “Barataria Basin Landbridge.” Since Phase 4 contains 10,835 linear ft (3302.5 m) of shoreline, but does not have a monitoring budget, the results presented below will focus on Phases 1, 2, and 3 (LDNR 2001). These phases collectively span 96,665 linear ft (29,463.5 m) of shoreline.

The following measurable goal will contribute to the evaluation of the above objective:

1. Decrease the mean rate of shoreline/bankline erosion in subsections of the project area stratified according to historical erosion rates along Bayous Perot and Rigolettes, Little Lake, and Harvey Cutoff.

b. Monitoring Elements

Aerial Photography

To document long-term shoreline movement, color infrared aerial photography (1:6,000 scale) of the Phase 1, 2, and 3 project and reference areas will be obtained. However, only a subset of the total acquired frames, representing approximately 20% of the entire project and reference area shoreline, will be georectified and analyzed with GIS for land/water ratio using standard procedures described in Steyer et al. (1995, revised 2000). One set of photography was obtained at the start of construction in 2002. Photography will again be obtained at the completion of construction (approximately 2008), and beyond that at five-year intervals (projected at 2013 and 2018).

Shoreline Survey

To evaluate marsh edge movement behind shoreline protection structures in the Phase 1, 2, and 3 project area and in designated reference areas, controlled GPS will be used to map marsh edge position of approximately 20% of the total project area shoreline using techniques described in Steyer et al. (1995, revised 2000). The areas surveyed will be the same as those analyzed for land/water ratio using aerial photography. In locations where dredged material is beneficially



placed during construction, the perimeter of the disposal area will be mapped to aid in determining shoreline gain due to the placement of dredge spoil. GPS surveys will be conducted within 60 days after construction to determine “as-built” conditions. Post-construction GPS surveys for each construction unit will be conducted in years 3 and 6.

c. Preliminary Monitoring Results and Discussion

Monitoring of the entire Phase 1, 2, and 3 project areas (76,000 ft [23,165 m] of shoreline) is cost prohibitive; therefore, monitoring will be limited to approximately 20 % of the shoreline behind each construction unit. To achieve the appropriate subsets for monitoring, the total length of each construction unit will be subdivided into 500-ft (152-m) sections. The number of sections randomly chosen for monitoring will be based on twenty percent of the total length of the construction unit rounded up to the nearest 500 ft (152 m). If multiple shoreline protection techniques are utilized within a construction unit, sections will be placed so that each technique is monitored.

Two 5,000-ft (1,524-m) sections of shoreline will be designated as reference areas. These sections will be located along the western side of Bayou Perot and the northwestern shore of Little Lake (Figure 5). Two randomly placed 500-ft (152-m) subsections within each reference area will be monitored using the same methodology as in the project area. Each strata of the project area will be assigned a reference area for comparison based on the similarity of historical shoreline erosion rates.

Aerial Photography

Aerial photography of the project and reference areas was obtained in 2002. Land-water analysis was conducted on the entire project and reference areas by the NWRC, rather than the 20% specified in the monitoring plan. A land-water map with the land acreages of each Phase of the project is presented in Figure 5. Because each phase is broken up geographically into several different locations with varying soil consistencies, acreages were determined for the individual areas within each phase to determine differences in erosion rates. Photography is projected to be obtained again during the post-construction period in 2008, 2013, and 2018. However, these dates are subject to change based on the completion of construction of the project.

Shoreline Survey

As-built surveys are being conducted as new construction units are completed. Surveys have been conducted on 20% of the total shoreline length behind CU 2 and 3. A survey of the entire reference area shoreline was also conducted (Table 1, Figure 6). All surveyed areas will be re-surveyed in three years. Once subsequent surveys are completed, analyses of shoreline erosion rates will be conducted.



Table 1. Construction and as-built shoreline survey dates of completed construction units and reference areas for the Barataria Basin Landbridge Shoreline Protection Project (BA-27), Phases 1, 2, and 3.

Construction Unit	Phase	Date Construction Completed	Date of As-Built Survey
1	1	5/1/2001	no monitoring
2	1	10/11/2002	3/19/2003
3	3	5/27/2004	7/20/2004
Reference Areas 1 and 2	N/A	N/A	5/13/2005



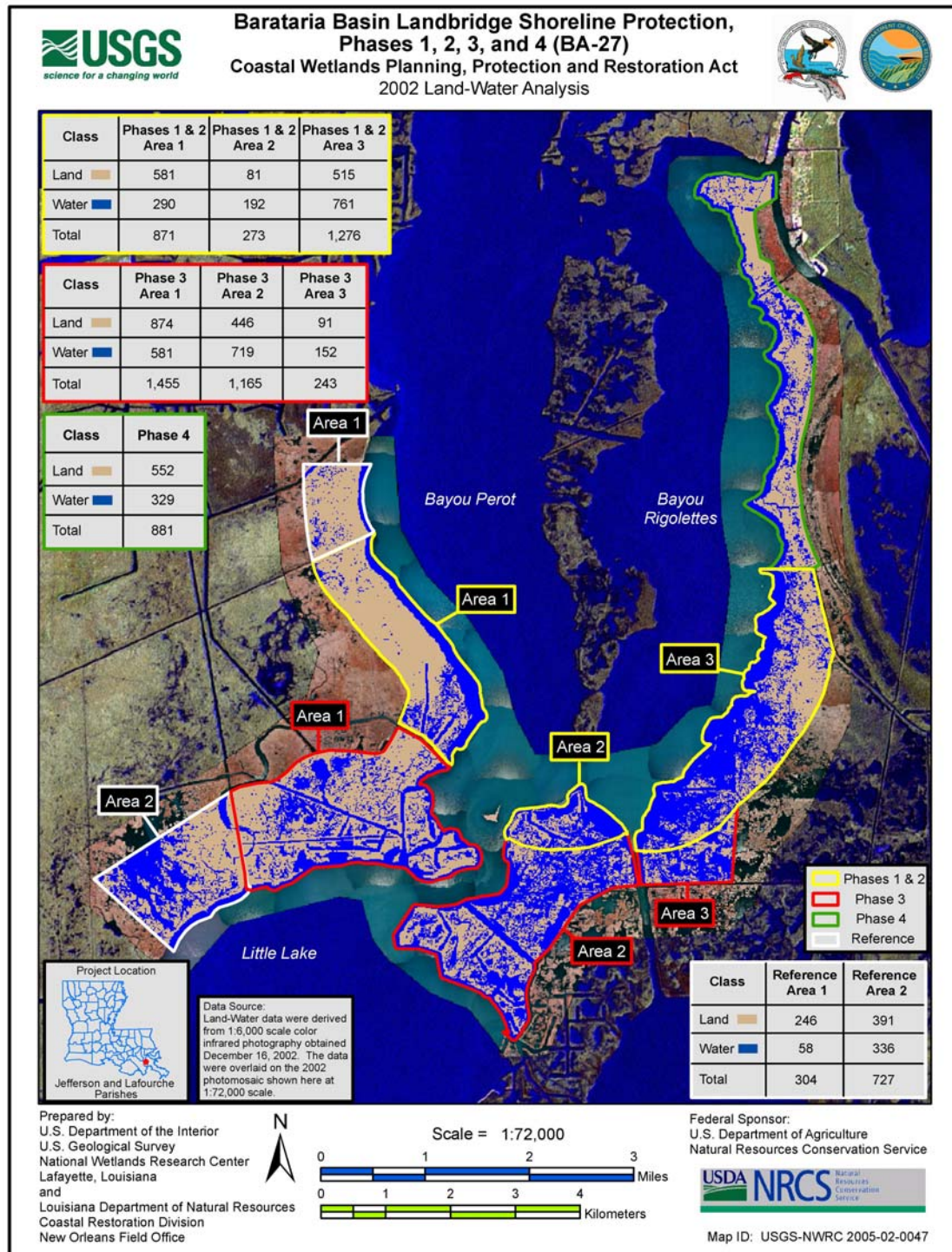


Figure 5. 2002 land-water analysis of the Barataria Basin Landbridge Shoreline Protection Project (BA-27), Phases 1, 2, 3, and 4. Because each phase is broken up geographically into several different locations with varying soil consistencies, acreages were determined for the individual areas within each phase to determine differences in erosion rates.

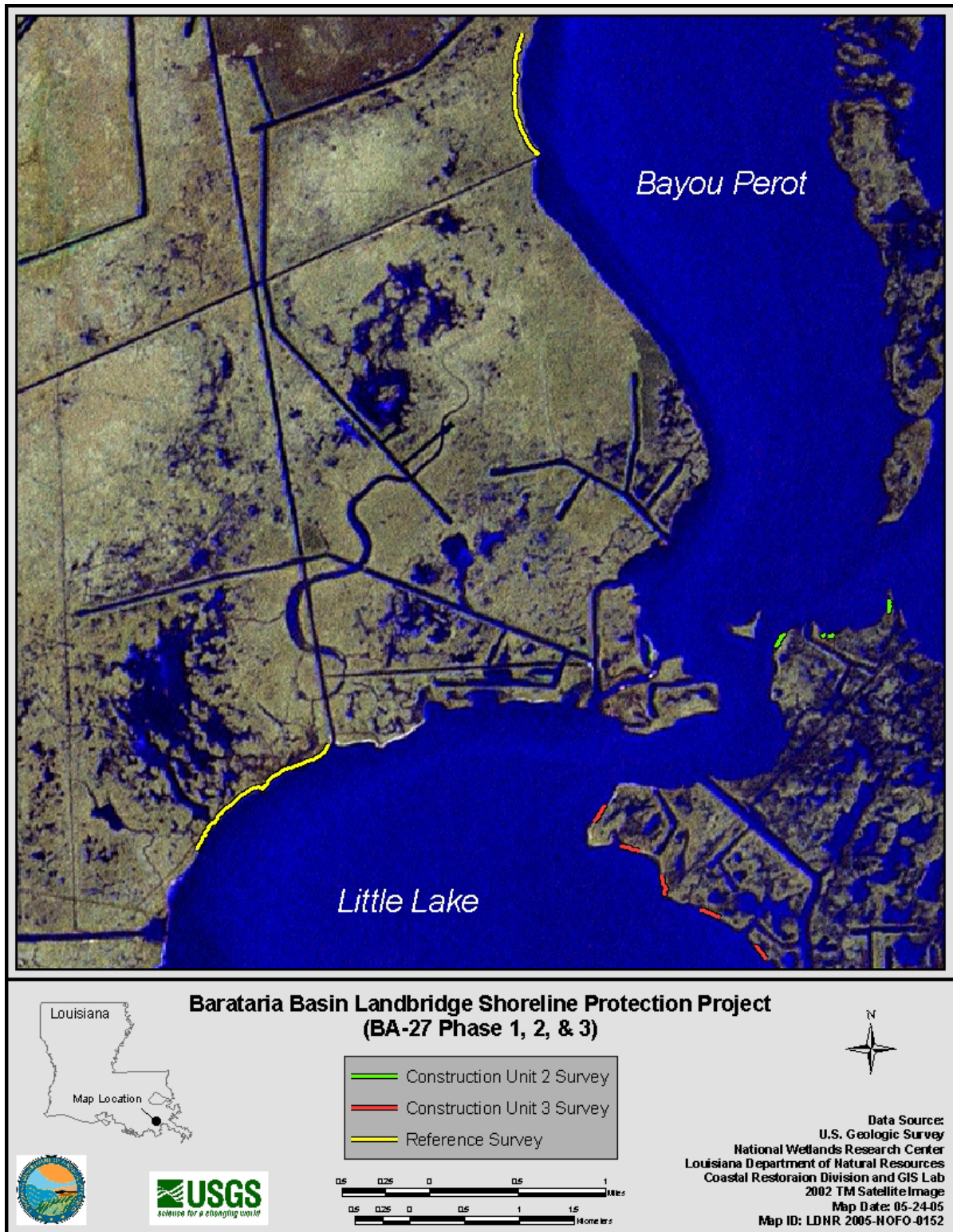


Figure 6. Locations of completed as-built shoreline surveys for the Barataria Basin Landbridge Shoreline Protection Project (BA-27), Phases 1, 2, and 3.

V. Conclusions

a. Project Effectiveness

Construction and monitoring of the project features are ongoing. We are not yet able to determine the effectiveness of this project in achieving the project goals. As further monitoring data are collected, the effectiveness of this project will be evaluated.

b. Recommended Improvements

There are no recommended improvements at this time.

c. Lessons Learned

Construction Unit 1

During construction of the test sections of CU 1, excessive amounts of settlement occurred with the placement of sections A and A1 (rock dike above freshly excavated spoil and rock dike above geotextile fabric), which caused the stoppage of work at these locations. The project completion report prepared by NRCS recommends that work of this type in areas of poor and unstable substrate conditions on long reaches should include the flexibility of relocating “fish dips” to utilize areas of excessive settlement rather than terminating work (USDA/NRCS 2001).

Other problems encountered with the construction of CU 1 included the chipping of the corners of the concrete panels while they were being installed into notches of the piles. NRCS has incorporated the following measures into the design of subsequent concrete pile and panel wall reaches: 1) Stainless steel shoes will be used to protect both the bottom of the concrete panel and the pile notch, providing a bearing surface to prevent chipping; 2) each panel will be grouted to one side of the notched pile to prevent rocking motion which could break and wear the surface of the concrete panel and pile notch; and 3) varying lengths of panels have been specified on long reaches to compensate for any obstruction encountered during construction (USDA/NRCS 2001).

Construction Unit 2

Stage placement technique was used in the construction of the rock dike of CU 2 with great success. On similar type projects with weak foundation soils, it is recommended that the entire first lift be constructed to an elevation of 0.5 ft (0.15 m) above the average water elevation and the final lift be placed after a specified number of days to allow for any initial consolidation of the soils. This method is recommended for rock dikes with a total height of 4.5 ft (1.4 m) or less. The rock dike constructed under this unit experienced very little consolidation between the initial lift of rock and the final lift (NRCS 2003).

Construction Unit 3

During construction of this unit, the spoil material resulting from excavation of access channels was used to fill seven small open water ponds located landward of the rock dike construction. In areas where beneficial use of spoil material is practical, it is recommended that this material be utilized for marsh creation.



VI. References

- Louisiana Department of Natural Resources (LDNR) 2001. Monitoring plan for BA-27 Barataria Basin Landbridge shoreline protection project (phases 1, 2 & 3), Louisiana Department of Natural Resources/Coastal Restoration Division, New Orleans, Louisiana. 10 pp.
- Louisiana Department of Natural Resources (LDNR) 2002a. Operation, maintenance and rehabilitation plan for BA-27 Barataria Landbridge shoreline protection phase 1 & 2, Louisiana Department of Natural Resources/Coastal Engineering Division, Thibodaux, Louisiana. 18 pp. plus appendices.
- Louisiana Department of Natural Resources (LDNR) 2002b. Operation, maintenance and rehabilitation plan for BA-27 Barataria Landbridge shoreline protection phase 3, Louisiana Department of Natural Resources/Coastal Engineering Division, Thibodaux, Louisiana. 9 pp. plus appendices.
- Natural Resources Conservation Service (NRCS) 2003. Project completion report, Barataria Landbridge shoreline protection project (BA-27) CU#2 Test Sections. 7 pp.
- Steyer, G. D., R. C. Raynie, D. L. Steller, D. Fuller, and E. Swenson 1995, revised 2000. Quality management plan for Coastal Wetlands Planning, Protection, and Restoration Act monitoring program. Open-file report no. 95-01. Louisiana Department of Natural Resources, Coastal Restoration Division, Baton Rouge, Louisiana. 97 pp. plus appendices.
- U.S. Department of Agriculture, Natural Resource Conservation Service (USDA/NRCS) 2000. Project plan and environmental assessment for Barataria Basin Landbridge shoreline protection project phases 1, 2 & 3 (BA-27), Jefferson and Lafourche Parishes, Louisiana, Alexandria. 23pp.
- U.S. Department of Agriculture, Natural Resources Conservation Service (USDA/NRCS) 2001. Project Completion Report, Barataria Landbridge Shoreline Protection Project (BA-27) CU#1 Test Sections. 16 pp.
- U.S. Department of Agriculture, Natural Resources Conservation Service (USDA/NRCS) 2002. Relative cost and short-term stability evaluation report for Barataria Basin Landbridge shoreline protection project (BA-27c)- Construction Unit No.1. 14 pp.



APPENDIX A

INSPECTION PHOTOS





BA-27 (Construction Unit No.1), 400 linear ft (122 m) composite rock dike (furrow method) located along the east bank of Bayou Rigolettes near the Harvey Cutoff Canal looking southeast.



BA-27 (Construction Unit No.1) 400 linear ft (122 m) concrete pile and panel wall located on the east bank of Bayou Rigolettes looking southeast.



BA-27 (Construction Unit No.1) concrete pile and panel wall and 200 linear ft (61 m) of rock dike with geotextile fabric and another 200 linear ft w/o geotextile fabric along east bank of Bayou Rigolettes looking southeast.



BA-27 (Construction Unit No.1) end of 200 ft (61 m) rock dike with and without geotextile fabric and beginning of composite rock dike along east bank of Bayou Rigolettes looking southeast.



BA-27 (Construction Unit No.1) 400 linear ft (122 m) concrete pile and panel located along east bank of Bayou Rigolettes looking southwest.



BA-27 (Construction Unit No.1) 400 linear ft (122 m) concrete pile and panel wall located along the east bank of Bayou Rigolette looking northeast.



BA-27 (Construction Unit No.2) Beginning of rock dike located along the west bank, at the mouth of the Harvey Cutoff Canal looking west.



BA-27 (Construction Unit No.2) Beginning of the rock dike located at the mouth of the Harvey Cutoff Canal along the west bank looking northwest.



BA-27 (Construction Unit No.2) low area along the rock dike located at the mouth of the Harvey Cutoff Canal looking northwest.



BA-27 (Construction Unit No.2) Low area along the rock Dike located at the mouth of the Harvey Cutoff Canal looking northwest.



BA-27 (Construction Unit No.2) Low area along the rock dike located at the mouth of the Harvey Cutoff Canal looking northwest.



BA-27 (Construction Unit No.2) rock dike located along the southern bank of Bayou Rigolettes entering Bayou Perot looking west.



BA-27 (Construction Unit No.2) end of the east reach of CU 2 located at the mouth of an existing location canal along the east bank looking northeast.



BA-27 (Construction Unit No.2) beginning of west reach of CU 2 located at the mouth of an existing location along the west bank looking west.



BA-27 (Construction Unit No.2) rock riprap dike (west reach) located along the south bank of Bayou Perot looking south.



BA-27 (Construction Unit No.2) end of west reach of CU 2 located along the south bank of Bayou Perot looking east.



BA-27 (Construction Unit No.3) Beginning of rock riprap dike located at the mouth of Bayou Perot near Little Lake on the south bank looking east.



BA-27 (Construction Unit No.3) rock riprap dike located near an existing camp along the south bank of Bayou Perot near Little Lake looking west.



BA-27 (Construction Unit No.3) rock dike located along the northeast bank of Little Lake south of Bayou Perot looking south.



BA-27 (Construction Unit No.3) shallow pond areas in which material from dredging of flotation was used to create marsh.



BA-27 (Construction Unit No.3) fish dip along rock riprap dike located along the northeast bank of Little Lake looking north.



BA-27 (Construction Unit No.3) fish dip location along the rock riprap dike located along the northeast bank of Little Lake looking north.



BA-27 (Construction Unit No.3) end of CU 3 rock rip rap dike.



APPENDIX B

THREE-YEAR BUDGET PROJECTIONS



BARATARIA LAND BRIDGE, PH 1 & 2 / BA27 / PPL7				
Three-Year Operations & Maintenance Budgets 07/01/2005 - 06/30/08				
Project Manager	O & M Manager	Federal Sponsor	Prepared By	
	<i>Babin</i>	<i>NRCS</i>	<i>Babin</i>	
	2005/2006	2006/2007	2007/2008	
Maintenance Inspection	\$ 3,000.00	\$ 3,000.00	\$ 3,000.00	
Structure Operation	\$ -	\$ -	\$ -	
Administration	\$ -	\$ -	\$ 1,200.00	
Maintenance/Rehabilitation				
05/06 Description:				
<i>E&D</i>	\$ -			
<i>Construction</i>	\$ -			
<i>Construction Oversight</i>	\$ -			
<i>Sub Total - Maint. And Rehab.</i>	\$ -			
06/07 Description				
<i>E&D</i>		\$ -		
<i>Construction</i>		\$ -		
<i>Construction Oversight</i>		\$ -		
<i>Sub Total - Maint. And Rehab.</i>		\$ -		
07/08 Description:	Surveying- Profile rock dike under Construction Unit No.2			
<i>E&D</i>			\$ 4,867.00	
<i>Construction</i>			\$ -	
<i>Construction Oversight</i>			\$ -	
		<i>Sub Total - Maint. And Rehab.</i>	\$ 4,867.00	
	2005/2006	2006/2007	2007/2008	
Total O&M Budgets	\$ 3,000.00	\$ 3,000.00	\$ 9,067.00	
		27		





OPERATIONS & MAINTENANCE BUDGET WORKSHEET

Project: Barataria Landbridge Shoreline Protection (Phase 1 & 2 Construction Units 1&2)

FY 05/06 –

Administration		\$	0
O&M Inspection & Report		\$	3,000
Operation:		\$	0
Maintenance:		\$	0
E&D:	\$	0	
Construction:	\$	0	
Construction Oversight:	\$	0	

Operation and Maintenance Assumptions:

Annual Inspection and Report (\$3,000)

FY 06/07 –

Administration		\$	0
O&M Inspection & Report		\$	3,000
Operation:		\$	0
Maintenance:		\$	0
E&D:	\$	0	
Construction:	\$	0	
Construction Oversight:	\$	0	

Operation and Maintenance Assumptions:

Annual Inspection and Report (\$3,000)

FY 07/08 –

Administration		\$	1,200
O&M Inspection & Report		\$	3,000
Operation:		\$	0
Maintenance:		\$	4,867
E&D:	\$	0	
Construction:	\$	0	
Construction Oversight:	\$	0	

Operation and Maintenance Assumptions:

Annual Inspection and Report (\$3,000)

Structural Assessment Survey – rock dike

(3 days @ \$1,420/day = \$4,260 x inflation factor (1.1425)) = 4,867



BARATARIA LAND BRIDGE, PH 3-CU#3 / BA27 / PPL9				
Three-Year Operations & Maintenance Budgets 07/01/2005 - 06/30/08				
Project Manager	O & M Manager	Federal Sponsor	Prepared By	
	Babin	NRCS	Babin	
	2005/2006	2006/2007	2007/2008	
Maintenance Inspection	\$ 3,000.00	\$ 3,000.00	\$ 3,000.00	
Structure Operation	\$ -	\$ -	\$ -	
Administration	\$ -	\$ -	\$ 1,500.00	
Maintenance/Rehabilitation				
05/06 Description:				
E&D	\$ -			
Construction	\$ -			
Construction Oversight	\$ -			
Sub Total - Maint. And Rehab.	\$ -			
06/07 Description				
E&D		\$ -		
Construction		\$ -		
Construction Oversight		\$ -		
Sub Total - Maint. And Rehab.		\$ -		
07/08 Description:	Structural Assessment Survey of rock dike.			
E&D			\$ 6,489.00	
Construction			\$ -	
Construction Oversight			\$ -	
		Sub Total - Maint. And Rehab.	\$ 6,489.00	
	2005/2006	2006/2007	2007/2008	
Total O&M Budgets	\$ 3,000.00	\$ 3,000.00	\$ 10,989.00	
		30		



OPERATIONS & MAINTENANCE BUDGET WORKSHEET

Project: Barataria Landbridge Shoreline Protection (Ph. 3 - Construction Units 3)

FY 05/06 –

Administration		\$	0
O&M Inspection & Report		\$	3,000
Operation:		\$	0
Maintenance:		\$	0
E&D:	\$	0	
Construction:	\$	0	
Construction Oversight:	\$	0	

Operation and Maintenance Assumption:

Annual Inspection and Report (\$3,000)

FY 06/07 –

Administration		\$	0
O&M Inspection & Report		\$	3,000
Operation:		\$	0
Maintenance:		\$	0
E&D:	\$	0	
Construction:	\$	0	
Construction Oversight:	\$	0	

Operation and Maintenance Assumptions:

Annual Inspection and Report (\$3,000)

FY 07/08 –

Administration		\$	1,500
O&M Inspection & Report		\$	3,000
Operation:		\$	0
Maintenance:		\$	6,489
E&D:	\$	6,489	
Construction:	\$	0	
Construction Oversight:	\$	0	

Operation and Maintenance Assumptions:

Annual Inspection and Report (\$3,000)

Structural Assessment Survey – rock dike

(4 days @ \$1,420/day = 5,680 x inflation factor (1.1425) = 6,489



APPENDIX C

FIELD INSPECTION REPORTS



MAINTENANCE INSPECTION REPORT CHECK SHEET					
Project Name: BA-27 Barataria Landbridge Shoreline Protection Demo CU#1				Date of Inspection: February 18, 2005	
Structure No. No number assigned				Inspector(s): B.Babin, G. Broussard, E. Lear, D. Garber, M. Trosclair	
Structure Description: Shoreline Bank Stabilization				Water Level: 0.8' NAVD 88	
Type of Inspection: Annual, Post Storm, other Annual				Weather Conditions: Clear / Windy	
Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Signage / Supports	Good			1 thru 6	Construction Unit No.1 - Bayou Rigolettes
Rock					Water level at gage located along Bayou Rigolettes near the BP pipeline and Texaco pipeline crossing read 0.8' NAVD at the time of the inspection.
Armored Embankment	Poor				Section A&A1 - the elevation of the rock dike above existing base was estimated to be at approximately 1.0' based on gage reading at pipeline crossing. The rock dike was constructed to an elevation of +3.0'. Calculated settlements range between 4.3' and 6.3' since construction was completed.
Settlement Plates	Good				
					Section B - composite rock dike section with lightweight aggregate core was estimated to be at approximately 1.3' NAVD. This structure was originally constructed to an elevation of 3.0' with a calculated settlement of 2.0' to 2.5' since completion of construction.
					Section C - nearly all of the composite rock dike with furrow method was below the existing water elevation of 0.8'. The rock dike has settled in excess of 3'.
					Section D -concrete pile and panel section was in good condition with no noticeable settlement. The corners of several existing concrete panels were chipped and slightly shifted between concrete piles. No other structural damage noted.
Construction Unit No. 1 of the Barataria Landbridge Shoreline Protection Project consists of the installation of 1,600 linear ft. of shoreline protection along the west bank of Bayou Perot and 1,600 linear feet of shoreline protection along the southeast bank of Bayou Rigolettes. Each location consists of four types of shoreline protection features. Below is a discription of the features constructed at each site.					Attached is the settlement data obtained over the lifetime of the demo sections collected by NRCS.
Section A and A1 - consists of 200 linear ft. of rock dike and 200 linear ft. of rock placed on freshly excavated spoil material.					Due to time constraints, the test sections located along the west bank of Bayou Perot were not inspected. However, settlement plate data collected by NRCS from the completion of construction are attached documenting settlement.
Section B - consist of 400 linear ft. of composit rock dike with a lightweight aggregate core encapsulated in geotextile fabric.					
Section C - consist of 400 linear ft. of composite rock dike using a forrow method to place and encapsulate the lightweight aggregate core.					
Section D - consist of 40 linear ft. of pre-stressed concrete pile and panel wall.					



BA-27 LANDBRIDGE CU # 1															
SETTLEMENT PLATE DATA															
BAYOU PEROT															
Location		INITIAL SET (Prior to rock placement)	1st CHECK (after rock placement)	2nd check	3rd check	4th check	5th check	6th check	7th check	8th check	9th check	10th check	11th check	12th check	Cumulative Settlement (feet)
Site # 1 Section A															
Sta. 1+35	Elevation	9.80	7.36	6.90	0.00	0	0.00								2.90
NOT ACCESSIBLE	Date Suveyed	1/1/2001	1/24/2001	2/14/2001											
	Incremental Set.		2.44	0.46	0.00	0.00	0.00								
Site # 1 Section B															
Sta. 3+35	Elevation	7.20	1.90	1.16	11.16	5.82	5.4	5.4	5.1	5	4.9				12.30
N.400414.81	Date Suveyed	1/15/2001	1/24/2001	2/14/2001	2/14/2001	5/17/2001	8/14/2001	11/13/2001	2/21/2002	6/26/2002	2/11/2003				
E.3652752.43	Incremental Set.		5.30	0.74	0.00	5.34	0.42	0.00	0.30	0.10	0.10				
Site # 1 Section C															
Sta. 6+10	Elevation	8.70	8.62	7.60	7.48	7.01	6.65	6.6	6.5	6.1	5.9	5.7	5.6	5.5	3.20
N.400666.81	Date Suveyed	2/6/2001	2/8/2001	2/14/2001	2/21/2001	3/14/2001	3/30/2001	4/27/2001	5/17/2001	8/14/2001	11/13/2001	2/21/2002	6/26/2002	2/11/2003	
E.3652614.42	Incremental Set.		0.08	1.02	0.12	0.47	0.36	0.05	0.10	0.40	0.20	0.20	0.10	0.10	
Site # 1 Section D															
Sta. 8+10	Elevation	7.40	6.88	6.18	5.57	5.16	4.80	4.80	4.60	4.30	4.2	3.9	3.7	3.6	3.80
N.400843.16	Date Suveyed	2/6/2001	2/8/2001	2/14/2001	2/21/2001	3/14/2001	3/30/2001	4/27/2001	5/17/2001	8/14/2001	11/13/2001	2/21/2002	6/26/2002	2/11/2003	
E.3652519.96	Incremental Set.		0.52	0.70	0.61	0.41	0.36	0.00	0.20	0.30	0.10	0.30	0.20	0.10	
Site # 1 Section E															
Sta.10+85	Elevation	7.40	7.17	6.97	6.68	6.20	6.05	6	5.9	5.9	5.5	5.4	5.2	5.2	2.20
N.401083.61	Date Suveyed	2/12/2001	3/6/2001	3/9/2001	3/14/2001	3/30/2001	4/13/2001	4/27/2001	5/17/2001	8/14/2001	11/13/2001	2/21/2002	6/26/2002	2/11/2003	
E.3652389.54	Incremental Set.		0.23	0.20	0.29	0.48	0.15	0.05	0.10	0.00	0.40	0.10	0.20	0.00	
Site # 1 Section F															
Sta. 12+85	Elevation	8.40	8.00	7.40	7.00	6.90	6.84	6.80	6.60	6.40	6.30	6.20	6.20		2.20
N.401260.26	Date Suveyed	2/13/2001	3/6/2001	3/14/2001	3/30/2001	4/13/2001	4/27/2001	5/17/2001	8/13/2001	11/13/2001	2/21/2002	6/26/2002	2/11/2003		
E.3652295.51	Incremental Set.		0.40	0.60	0.40	0.10	0.06	0.04	0.20	0.20	0.10	0.10	0.00		
BAYOU RIGOLETTES															
Site # 2 Section A															
Sta. 17+24	Elevation	10.75	9.96	9.52	9.30	8.79	8.60	8.50	8.00	7.80	7.80	7.60	7.60		6.30
N.396940.98	Date Suveyed	2/15/2001	3/2/2001	03/06/01	3/9/2001	3/30/2001	4/27/2001	5/17/2001	8/20/2001	11/17/2001	2/19/2002	6/27/2002	2/11/2003		
E.3665094.34	Incremental Set.		0.79	1.23	0.66	0.73	0.70	0.29	0.60	0.70	0.20	0.20	0.20		
Site # 2 Section B															
Sta. 15+24	Elevation	7.80	6.16	5.80	5.60	5.10	4.87	4.79	4.20	4.10	3.80	3.70	3.50		4.30
N.396790.31	Date Suveyed	2/15/2001	3/2/2001	03/05/01	03/09/01	03/30/01	4/27/2001	5/17/2001	8/20/2001	11/7/2001	2/19/2002	6/27/2002	2/11/2003		
E.3664961.75	Incremental Set.		1.64	0.36	0.20	0.50	0.23	0.08	0.59	0.10	0.30	0.10	0.20		
Site # 2 Section C															
Sta. 12+49	Elevation	7.80	7.37	6.80	6.56	6.32	6.24	5.90	5.80	5.60	5.50	5.40			2.40
N.396268.94	Date Suveyed	3/13/2001	3/16/2001	03/22/01	03/30/01	4/27/2001	5/17/2001	8/20/2001	11/7/2001	2/19/2002	6/27/2002	2/11/2003			
E.3664497.45	Incremental Set.		0.43	0.57	0.24	0.24	0.08	0.34	0.10	0.20	0.10	0.10			
Site # 2 Section D															
Sta. 10+43	Elevation	7.80	7.60	7.08	6.76	6.55	6.49	6.20	6.10	5.90	5.80	5.80			2.00
N.369116.69	Date Suveyed	3/15/2001	3/16/2001	03/22/01	03/30/01	4/27/2001	5/17/2001	8/20/2001	11/7/2001	2/19/2002	6/27/2002	2/11/2003			
E.3664362.32	Incremental Set.		0.20	0.52	0.32	0.21	0.06	0.29	0.10	0.20	0.10	0.00			
Site # 2 Section E															
Sta. 1+50	Elevation	8.60	7.71	7.33	6.94	6.66	6.26	6.00	5.70	5.30	5.30	5.30			3.30
N.395910.79	Date Suveyed	3/7/2001	3/10/2001	03/15/01	03/30/01	4/27/2001	5/17/2001	8/20/2001	11/7/2001	2/19/2002	6/27/2002	2/11/2003			
E.3664176.58	Incremental Set.		0.89	0.38	0.39	0.28	0.40	0.26	0.30	0.40	0.00	0.00			
Site # 2 Section F															
Sta. 3+50	Elevation	8.70	8.08	7.32	6.64	6.33	6.26	6.00	5.80	5.40	5.30	5.20			3.50
N.395758.29	Date Suveyed	3/7/2001	3/10/2001	03/15/01	03/30/01	4/27/2001	5/17/2001	8/20/2001	11/7/2001	2/19/2002	6/27/2002	2/11/2003			
E.3664042.62	Incremental Set.		0.62	0.76	0.68	0.31	0.07	0.26	0.20	0.40	0.10	0.10			

(Source: Settlement Data-USDA/NRCS)



